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Fiscal instruments for sustainable maintenance of apartment housing in Korea

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ABSTRACT

The tendency in Korea for new construction has contributed to a surplus supply of housing due to the construction of a tremendous stock of houses in a short period of time under government-led housing supply policies. Since the 2000s, driven by excessive construction and social changes such as the improvement of living quality, national housing has seen a surplus with indications as high as a 110 percent increase in the rate of supply. In addition, because approximately 80 percent of existing apartment houses are nearing 20 years from initial construction, remodeling is anticipated to emerge as an important issue going forward. The apartments of Seoul, as well as first generation new cities such as Bundang and Ilsan, are reaching the point of 20 years from initial construction, and thus a period requiring extensive remodeling for repairs and improvement is approaching. Financial support in the form of loans, subsidies, and tax incentive programs impelling the maintenance of existing apartment houses is urgently needed. This study proposes a financial support plan for the maintenance of apartment housing in Korea through comparison and analysis of financial support systems such as loans, subsidies, and tax incentive programs in New York City and Tokyo.

Contents

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1. Introduction

1.1. Background and objective of research

Korea has shown a tendency for new construction by building a tremendous stock of new houses within a short period of time under government-led housing supply policies. In the 1970s, the Housing Construction Promotion Act was established for the large scale construction of houses as a way of economic growth. The act served as the foundation for a housing supply boom, and in the early 1980s, a construction plan to build five million households was developed, which led to the supply of a tremendous stock of houses. In addition, from the mid 1980s to the early 1990s, driven by housing shortages due to economic boom and urban concentration, the construction of two million households in five regions, such as Bundang and Ilsan (known as first generation new cities), was completed [1].

Since the 2000s, the housing market has faced a surplus, with the rate of supply reaching 110 percent [2]. The surplus has occurred in accordance with social changes, such as excessive construction, lower birth rates, and improvements to the quality of life for residents. In addition, because approximately 80 percent of existing apartment houses are nearing 20 years [3] from initial construction, extensive remodeling is anticipated to emerge as an important issue in the foreseeable future. Therefore, as the prospect of large scale remodeling of mass-constructed apartments emerges as a necessity, certain financial contributions from the public sector are demanded more urgently than ever before through programs such as loans, subsidies, and tax incentive programs to encourage the recycling and sustainable maintenance of existing apartment housing in the capital region, including Seoul.

The governing bodies and relevant organizations in Korea, however, are lacking detailed measures for apartment housing maintenance support. The options for government-supported financial programs for maintenance are very poor, except for some financing available from commercial financial organizations. Furthermore, the ratio of investment in apartment housing maintenance in Korea compared to the amount invested for new construction has been surveyed at 0.69 percent (approximately 280 billion won), rendering national maintenance investments negligible for Korea [4].

Considering that apartment houses that were supplied in mass quantity 20 to 30 years ago are taking up approximately 54 percent of all current housing in Korea, and furthermore that such housing is approaching a period of need for extensive repairs, research efforts for overseas financing programs, and the actualization of government guaranteed financing systems are critical at this point. More than ever, the public sector is required to complement the credit of the low-income classes for sustainable maintenance and the establishment of public funds for financial programs to support housing.

Looking at the example of New York City, New York has been deemed one of the top cities[1] in the world [5–7] in the ranking of world cities for general evaluation of city economy, stability of politics, and residential environments. From the standpoint of the economy and stability of politics in particular, the public financing programs of New York City are very highly evaluated. Notably, New York City adheres to policies of recycling existing housing, along with new construction, as part of the city's fundamental housing policies. New York City is equipped with various financing programs to support sustainable maintenance of its vast stocks of houses and to accomplish policy goals.

In Japan, mainstream housing policies have recently changed. Impacted by social changes such as lower birth rates, an aging society, and a diminishing number of households, housing policies are undergoing a transition from increasing the existing housing supply to improving the quality of life for residents [8,9]. Accordingly, the government transformed construction policies significantly toward an emphasis on improving the existing market through the establishment of the Residential Life Framework Act in 2006. In this process, the Japanese government's housing policies complement emerging environmental changes by transitioning from policies of new construction to policies of maintenance for existing housing [10,11].

As illustrated, the U.S. and Japan are making concrete efforts for the qualitative improvement of houses, bolstered by institutional complementation for support. In Korea, residential welfare policies, including the improvement of living quality, have been reinforced to some extent since the 2000s, but relevant studies and systematic efforts are still insufficient. Thus the changes in U.S. and Japanese housing policies serve as positive models for the development of better housing policies in Korea.

Therefore, this study compares and analyzes the financial support systems of New York City and Tokyo Metropolis, which are enabling the recycling of existing houses by means of loans, subsidies, and tax incentive programs, to propose an optimal system of support by the public sector for the maintenance of existing housing in Korea.

1.2. Research objects and methods

This study compares and analyzes financing programs such as loans, subsidies, and tax incentives for the private apartment housing (defined as five stories or higher) of Seoul[2], Korea, New York City, U.S., and Tokyo, Japan.

The organizations most relevant to this paper were identified through extensive research of various papers and existing literature, and are shown in Table 1. Appropriate loans, subsidies, and tax incentive programs were deduced through visitation and interviews with concerned local personnel, as surveyed in Table 2.

Expert opinions about the financial support systems for housing maintenance in both New York and Tokyo were gathered in order to apply the information to the financial support of apartment housing maintenance in Korea. Subsequently, the financial support system (proposal) and financial support promotion plan were proposed.

2. Selection of cities to be compared—policies for apartment housing maintenance by city

This section examines the execution mechanics of apartment housing maintenance in each of the focal cities. By scrutinizing

[1] New York was No. 1, No. 2 and No. 3 on the global power city index, the worldwide center of commerce index, and the index of globalization and world cities. Tokyo was No. 4, No. 3 and No. 6.

[2] The scope of subjects for this study was limited to the city of Seoul for study efficiency, but may include Korean first generation cities, such as Bundang and Ilsan.

Table 1
Surveyed organizations.

City name	Class	Survey organizations
New York – 1st **survey:Mar. 12–Mar. 16, 2007** – **2**nd **survey:Feb. 24–Mar. 7, 2008**	City hall	– Department of Building (DOB) – Department of Housing Preservation & Development (HPD)
	Companies	– Handel Architcs – Mitche/Giurgola Architects – MDSzerbaty + Associates Architecture LLC – T-Design Architecture PC – Gruzen Samton – Arctangent
	Associations	– CAI (Community Associations Institute) – IREM (Institute of Real Estate Management) – NAA (The National Apartment Association)
Tokyo – **July 17–Aug. 8, 2008**	Metropolis hall	– Tokyo Metropolis municipalities
	Associations	– Japanese Architectural Disaster Prevention Association – Building & Equipment Long-life Cycle Association (BELCA) – Tokyo Metropolis Disaster Prevention Matitsukuri Center – Housing Financing Support Organization – Japanese House Management Cooperative Council – Mansion Management Center – Mansion Recycling Council
Seoul – **Aug. 18–Sept. 5, 2008**	Government and city hall	– Korea Ministry of Land, Transport and Maritime Affairs, City of Seoul
	Related organizations	– Korea Facility Safety Corporation – Korea Land & Housing Corporation – Korea Institute of Construction Technology – Long Lifecycle Apartment House Research Group
	Associations	– House Managers Association

Table 2
Survey Subjects.

Class	New York	Tokyo	Seoul
Loans	– The Participation Loan Program – New Partners Program – The Small Buildings Loan Program – Home Improvement Program – Rehabilitation New Partners Program – Article 8A Loan Program – Supportive Housing Loan Program – Senior Citizen Home Assistance Program	– Loan programs by Tokyo Metropolis – Mansion renovation construction organization systems – Loan programs by Tokyo Metropolis municipalities – Loan programs by housing financing support organizations – Mansion public reformation loans – Rented houses reformation loans – Aged payment exemption systems	None
Subsidies	– Primary Prevention Program – (Lead-Based Paint Treatment)	– Tokyo Metropolis mansion anti-seismic diagnosis organization project – Tokyo Metropolis mansion anti-seismic construction promotion project – Tokyo Metropolis municipality subsidy programs	None
Taxes	– J-51: As-of-right tax exemption and abatement for residential rehabilitation or conversion to multiple dwellings – 421-b: Partial tax exemption for new construction or substantial rehabilitation of owner-occupied one- and two-family homes – 421-g: Tax exemption and abatement for conversion of commercial buildings to multiple dwellings (Downtown Manhattan)	– Housing loan tax reduction systems – Anti-seismic remodeling promotion tax incentive – Systems for the promotion of house remodeling tax incentives for the aged, etc.	None

arrangements for the maintenance aspect of various housing maintenance support systems and master plans for housing in New York, Tokyo, and Seoul, the status and deficiencies of apartment housing maintenance in Korea are assessed.

2.1. The U.S.

In the U.S., the supply of financing for housing has been undertaken by private financial organizations, and the government has offered additional support for the acquisition of housing through measures of preferential treatment, such as government guarantees for housing loans to borrowers and income tax incentives [12]. Financing for public housing in the U.S. does not entail direct loans from the government, but in the course of borrowers seeking loans for the purchasing of houses from the designated funds of private financial organizations, in cases where collateral capacity is insufficient, certain government organizations will supplement the loans.

In other words, financing for public housing is not the type of loan that the government supports directly with designated funds, but it is the type that loan financing organizations, such as the Federal Housing Administration (FHA) and Veterans Administration (VA), guarantee with housing loan funds for lower income classes that lack funds and sufficient credit scores. The FHA provides a guarantee of service mainly for people that have difficulty in getting loans for housing, such as the middle to low income classes or first-time home buyers. The VA supports the purchasing of homes by veterans of the U.S. military [13].

Fluidizing organizations of the U.S. are buying with preference to loan bonds whose credit bonds were supplemented by public guarantees of insurance from financing organizations such as the FHA and VA. Otherwise private mortgage insurance is required. Fluidizing intermediary organizations of the U.S. include Ginnie Mae, which is a government organization, and Fannie Mae and Freddie Mac, which are government-related organizations. These organizations play the role of promoting the provision of long-term funding for housing market financing through the fluidization of mortgages [14].

In the U.S., the amount of money loaned is determined by the value of house collateral. This contingency leads to proactive financing for remodeling and repairs for the sustenance of collateral value, and typically the FHA or the above-mentioned Freddie Mac Federal Home Loan Mortgage Corporation (FHLMC) makes financial guarantees for this type of housing maintenance. A loan program is in operation in New York wherein private banks offer funds guaranteed by New York City or the FHA in cases of loan applicants who want funds for remodeling or repairs in order to meet applicable requirements [15].

Master plans for housing currently underway in New York City can be divided into a first part known as the 2006–2009 Strategic Plan of the NYC Department of Buildings (hereafter the DOB), and the New Housing Marketplace, which is an initiative widely billed as having purposes of Creating Housing for the Next Generation, within the timeframe of 2004–2013, managed by the New York City Department of Housing Preservation and Development (hereafter the HPD).

In particular, a look into the distribution of funds (see Table 3) for the New Housing Marketplace (hereafter used interchangeably with the House 10 Year Plan) indicates that with new construction at 35.2%, recycling of existing housing at 36.9%, support housing at 11.8% and an expense budget at 16.8%, the idea of preservation by way of recycling existing housing occupies a more significant portion of the budget than new construction [16–18]. Thus preservation activities are the most robust aspect of New York City's long-term plans for housing.

Table 3
The new housing marketplace—creating housing for next generation (Unit: $1000).

Class	Invested amount
New construction	35.2%
Owned house	$358,000
Rented house	$2,290,000
Sub-total	$2,648,000
Preservation	36.9%
Owned house	$92,000
Rented house	$2,685,000
Sub-total	$2,777,000
Support housing	11.1% $832,000
Expense budget	16.8%
Measures for deserted houses, house education etc.	$1,264,000
Total	$7,521,000

Source: The new housing marketplace—creating housing for the next generation 2004–2013.

As for financing the plans, with the internal budget of New York City at approximately $5.8 billion (77.6%), the New York City Housing Development Corporation (NYCHDC) at approximately $0.5 billion (7.3%), and private financing at approximately $1.1 billion (15.1%), the majority of funds are appropriated from the internal budget of New York City and the budgets of various private financing organizations.

In the case of the 2006–2009 Strategic Plan, an extensive building information managing system was developed with all elevator inspections, pipe inspections, violations, applications and approvals enabled for online processing through the internet. Consequently, the safety and efficiencies of existing building management systems were dramatically reinforced. The New Housing Marketplace is dually focused on the development of loans and funding programs that promote the recycling of housing, and on providing new incentives for the smooth repair and maintenance of buildings to bolster the housing supply in response to housing shortages. New York City's master plans for housing are summed up in Table 4.

2.2. Japan

Since World War II, the government has primarily managed the housing policies of Japan. The war caused twenty million people, which is the equivalent to one fourth of the entire population, to lose their houses, thereby forcing the majority of people to reside in densely populated, older houses lacking decent facilities. With such serious housing problems, post-war Japan underwent a dire housing supply shortage. Thus the Japanese government strove to supply houses directly and indirectly to the displaced population by investing government funds based on institutional support.

During this period in 1950, the Housing Financing Announcement Act established an organization called the Government Housing Loan Corporation of Japan (GHLC). In 1951, the Government Operated Housing Act was established, thereby initiating the full-scale promotion of government-led public housing. Subsequently in 1955, the Japanese Housing Corporation was established to execute housing policies focused on the acquisition of owned houses. By 2003, the rate of acquisition of owned houses reached 61.2%[3] [19].

Recently, however, the main housing supply trends are changing in Japan. Along with social changes such as the transition of

[3] Such supply focused housing policies have played a positive role in post-war recovery and have made eye-opening accomplishments. Loan accomplishments amount to support for 19.09 million households (i.e., 180 trillion Yen), which is equivalent to 30 percent of total houses in the nation.

Table 4
Maintenance related master plans of New York City.

Item	2006–2009 Strategic plan	The new housing marketplace—creating housing for the next generation (2004–2013)	The new housing marketplace—progress report 2005
Objective	– Strengthen safety, integrity and services based on technology and professionalism	– Supply affordable housing through new construction and existing house recycling	– Supply additional affordable housing
Planned period	– 2006–2009	– 2004–2013	– From 2005
Executing organization	– DOB of New York City	– HPD of New York City	– HPD of New York City
Plan contents	– Promote construction and acquire safety rules – Prevent government personnel corruption – Construct and maintain with the use of IT techniques – Foster experts	– Explore new housing sites for the supply of affordable housing – Develop incentives for house construction – Encourage private funds for affordable house construction – Execute repair of government operated housing	– Promote repair of government operated housing – Creation part: Use city owned land for house supply Supply affordable housing through large scale development – Preservation part: Develop loan and fund programs for the promotion of preservation Provide new incentives for building repair and maintenance
Contents on maintenance	– Develop systems that manage building information via internet – Manage elevator inspection records, pipe inspections, applications, approvals, etc. via internet – Strengthen safety inspection	– Provide loans and funding (about $2.8 billion) for the recycling of existing affordable housing	– Develop loan programs for the promotion of preservation – Develop new strategies for aged buildings

housing policies from a focus on quantity to quality, lower birth rates, an aging society, and a decreasing number of households, housing policy itself is experiencing fundamental changes. In this regard, the direction of government policy has changed from a policy based on new construction to a policy that emphasizes the improvement of residential comfort in existing houses and the recycling of house stocks through the Residential Life Framework Act (2006) [20].

Hence, the Japanese government is supplying funding for housing to people that meet certain qualifications. Varying forms of government funding include the coordination of financing and guarantees of loan money with subsidies on interest. These guarantees offer further support by providing borrowers with a payback schedule based on interest subsidies. Such generous guarantees on housing funding are made possible by an organization called the mansion management center of the Japanese Ministry of Land, Infrastructure, Transport and Tourism, which is similar in form to corresponding departments of the U.S. government.

As for maintenance related plans (see Table 5), among the master plans for housing that the Japanese government is currently executing, Tokyo is seeing efforts for the extension of mansion lifecycles, the smoothing of renovation, the provision of information about the histories of houses and businesses, the promotion of long lifecycle housing, and proper maintenance and reformation of existing housing. The Residential Life Framework Plan is designed to promote planned repairs of mansions within prescribed timeframes, the preservation of older mansions, and to provide long-term fixed loans for stability through arrangements with key players in the housing financing market [10,21].

2.3. Korea

The Korean War devastated key industries and houses in Korea, and subsequently, government-led housing supply policies have been conducted as in Japan. In the 1970s, the foundations for a massive supply of housing were laid through the establishment of the Housing Construction Promotion Act. In the early 1980s, massive stocks of houses were supplied through the configuration of a plan for the construction of five million houses. During the mid-1980s through the 1990s, the housing shortage accelerated along with the urban concentration that resulted from the economic boom. At this time a plan for the construction of new houses for two million households in five regions, including Bundang and Ilsan (the first generation new cities), was announced.

Since this legislation required the narrow geography of these regions in Korea to accommodate many people, the construction that was done focused mainly on high-rise apartment housing to optimize space. From the 1990s to 2000s, Korean construction companies suffered extreme managerial hardships due to a global economic crisis that saw a significant increase of the construction industry's piece of the economy. During this time, housing policies were used for economic stimulus. In addition, the new administration of the regime of Rho Mu-Hyeon, in its pursuit of social welfare and equal distribution, emphasized measures to engender stability among the residences of previously estranged classes [1].

Accordingly, Korea constructed vast stocks of houses in a short period of time, driven by government-led policies of housing supply. Korea has now reached a surplus of houses with the rate

Table 5
Maintenance related master plans of Japan.

Item	Tokyo Metropolis housing master plan	Residential life framework plan
Objective	– Acquire safety and stability of housing supply and create sustainable residences across generations	– Respond to local situations aptly in association with relevant measures like putting emphasis on stocks and market, promoting welfare, creation of villages, etc.
Planned period	– 2006–2015 (10 years)	– 2006–2015 (10 years)
Executing organization	– Tokyo Metropolis	– Japanese Ministry of Land, Infrastructure, Transport and Tourism
Planned directions	– Secure high quality house stocks and comfortable residential environments – Organize housing market environment – Secure residence stability for citizens	– Form high quality house stocks and hand them down to future generations – Form comfortable residential environments – Promote the type of residential market environment that meets various residential demands of citizens – Secure residence stability for people who want housing
Major contents on maintenance	– Extend mansion lifecycles and promote reconstruction – Execute provision of information on housing history and business operators – Promote house reformation, etc.	– Promote supply, proper maintenance and reformation of long lifecycle houses – Promote planned repair of mansions and preservation of aged mansions – Optimize housing financing market for stable supply of long-term fixed loans

Table 6
Maintenance related master plans in Korea.

Item	Framework plan for the safety and maintenance of 2nd facility	Housing general plan (2003–2012)	Seoul housing general plan (2003–2012)
Objective	– Realize accident-free facilities, prevent defective diagnosis and improve facility safety conditions	– Fundamentally solve housing defect problems – Stabilize housing market – Improve standards of living for residents	– Stabilize Seoul's housing market and improve the residential welfare of low income households
Planned period	– 2007–2012 (5 years)	– 2003–2012 (10 years)	– 2003–2012 (10 years)
Executing organization	– Ministry of Land, Transport and Maritime Affairs	– Ministry of Land, Transport and Maritime Affairs	– City of Seoul
Planned directions	– Improve safety management systems – Improve repair/maintenance systems – Improve the technical power of facility maintenance subjects – Eject faulty business operators and foster outstanding business operators – Improve the technical levels of safety and maintenance engineers – Establish preventive maintenance systems – Manage the safety of facilities utilizing ubiquitous techniques	– Supply housing sustainably to meet various demands of local housing market – Maintain the stability of housing market by suppressing speculative demands – Utilize housing stocks efficiently – Strengthen public housing policies to stabilize supply for low income class	– Strengthen the residential welfare of low income households to maintain social equality – Obtain high quality housing stocks – Improve residential environments with emphasis on sustainability and living quality – Specialize maintenance systems for apartment housing to secure stability
Major contents of maintenance	– Same as above	– Develop techniques to strengthen the performance of existing housing – Construct variable types of housing that can be easily reformed or remodeled – Support the activation of house remodeling	– Promote extension of apartment housing lifecycles – Rationalize business administration management

of housing supply at 110 percent [22,23]. Because 80 percent of existing apartment houses are nearly 20 years past initial construction, their remodeling and repair is anticipated to emerge as an important matter in the near future. In addition, as social circumstances change according to improvements in national income, lower birth rates, and an aging society, now is a critical moment for the conversion of national housing policies.

Regarding the housing maintenance policies of Korea, on the other hand, such government policies have been conducted with a focus on new construction and structural safety, rather than the recycling of existing houses. This approach is based primarily on the idea of "safety first". Recent master plans for housing as shown in Table 6 indicate that the framework plan for the safety and maintenance of second facilities is being conducted with

Table 7
Cumulative ratios of apartment housing from year of construction completion (Unit: 1000 households, %).
Source: House total survey 2005 by Statistics Office.

Class	Nationwide	Ratio	Seoul	Ratio
Accumulation of the number of houses up to 50 years	12,495	100.0	2242	100.0
Accumulation of the number of houses up to 40 years	12,084	96.7	2224	99.2
Accumulation of the number of houses up to 30 years	11,782	94.3	2185	97.4
Accumulation of the number of houses up to 20 years	9928	79.5	1817	81.1
Accumulation of the number of houses up to 10 years	5629	45.1	1018	45.4

emphasis on the improvement of safety and maintenance systems, organization of safety and maintenance systems, advancement of engineer qualifications, and the establishment of preventive maintenance systems.

General plans for housing (2003–2012) propose several focused objectives for sustainable maintenance, including the development of performance strengthening techniques for existing houses, the construction of variable types of houses that can be easily renovated or remodeled, and support for the activation of house remodeling. The general plans for Seoul city housing are focused on the maintenance of existing houses for lifecycle extension, and safety management in aging houses, according to the disproportionate ratio of apartment houses and very tall residential buildings among the city's existing houses [24–26].

In summary, the master plans for housing of the Korean Ministry of Land, Transport and Maritime Affairs for the city of Seoul are focused on the construction of variable types of houses that can be renovated or remodeled easily, as well as the lifecycle extension of existing apartment houses. Such practices are still at the research stage, and detailed measures are further required until the practical execution of sustainable maintenance can be implemented for housing on a full scale [27,28].

As for the status of financing for maintenance programs in Korea, financing programs are typically very poor, except for loans that are generally available from commercial financial organizations. According to a survey of interviews with city authorities of Seoul, the city of Seoul has few policies supporting apartment housing maintenance and no financial support for private apartment housing in operation. Instead the city is supporting public facilities such as play equipment on children's playgrounds within general apartment houses. Furthermore, regarding the execution of movements for remodeling or reconstruction that are commonly filed with the city of Seoul, community associations are responding with a ratio of remodeling at 10 percent to reconstruction at 90 percent. Remodeling is admittedly the chosen alternative as the eligibility for reconstruction is increasingly strict.

In addition, the 2008 survey of interviews with the Ministry of Land, Transport and Maritime Affairs indicates that the ministry has no policy of financial support for the sustainable maintenance of housing. That is, the ministry can support apartment housing according to the municipal ordinance mandated by Article 43 of the Housing Act, but since such support is eligible only to playgrounds, senior centers, and superficial repairs such as the replacement of sidewalk blocks, financial support is not directly related to the repair and maintenance of apartment houses.

As it turns out, the Korea Housing Financing Corporation, an organization that guarantees loans to applicants for the Jeonse lease system, and provides funds for the purchasing of houses from commercial banks, does not directly contribute to the financial support of maintenance for apartment housing. The corporation does operate a program for renovation funds that guarantees loans from commercial banks when applicants intend to renovate their houses. However, showing only four successful cases (equaling about 48 million won) in 2007, the renovation funds program is barely effective for the support of meaningful maintenance. Under the name of residential environment improvement projects, the Korea Land and Housing Corporation supports various improvements to the outside environment in areas such as painting, wallpapering, and playground maintenance for government-operated rental apartments managed by the corporation. They do not maintain any support for private apartment houses. When the ratio of financing for the maintenance of apartment houses in Korea is examined, the total amount of apartment housing maintenance contracts, equaling about 280 billion won, was 0.69 percent of 37 trillion 600 billion won as of 2009 [4]. Thus the corporation is found to have been making very negligible investments in private or government-led maintenance.

On the other hand, cumulative ratios of Korean apartment houses according to the year in which initial construction was completed are as follows: apartments up to 10 years from construction completion: 45.1%, apartments up to 20 years from construction completion: 79.5%, and apartments up to 30 years from construction completion: 94.3%, as shown in Table 7. These figures show that approximately 80 percent of existing apartment houses underwent initial construction within 20 years[4], which means that measures need to be taken in earnest for the maintenance of apartment houses going forward.

2.4. General opinions

In the U.S., financing for the purchase of houses and existing house maintenance has been a common practice for a long time. For this reason, the U.S. government has effective systems to facilitate the smooth utilization of loans for people lacking funds, by way of strong guarantees for housing financing to complement the personal credit ratings of qualifying individuals.

Furthermore, U.S. master plans for housing are anticipated to produce comprehensive effects, such as solving housing shortages, boosting the economy, and creating opportunities for employment as investments are increasingly made in policies of house preservation rather than new construction.

In Japan, a great deal of public funding has been poured into the housing supply through the establishment of particular organizations such as the Japanese House Financing Corporation and the Japanese Housing Corporation, which handled the housing shortage resulting from World War II. According to the Residential Life Framework Act, however, which was established along with social changes such as lower birth rates, an aging society, and a diminishing number of households, current housing policies are increasingly focused on the improvement of residential comforts and the recycling of existing houses. Just as with the U.S., the individual credit of prospective residents is complemented through government guarantees, which are executed by way of designated organizations committed to financing this cause.

[4] In various Korean literature (Kim et al., 2010. A study on estimation status and improvement plan of the repair and replacement cycle of a building. The Korea Institute of Building Construction 10(1), 193–198.), the repair and replacement period of building finishing materials such as tiles, etc. and equipment is set within 5 to 20 years, and that of major structures is 40 years or longer.

Also, current master plans for housing involve low interests on long-term fixed loans as a way of supporting the maintenance of existing houses, rather than the construction of new houses.

Currently in Korea there is a surplus of houses, with the rate of house supply reaching 110 percent due to rapid economic growth and government-led policies of housing supply that emerged in the past. Furthermore, due to social changes such as lower birth rates, an aging society, and national demands for the improvement of residential quality, significant changes are required for housing policies going forward.

Additionally, with apartment houses occupying approximately 52 percent of all existing houses, they comprise a significant portion of residential life. As apartments in first generation new cities such as Bundang and Ilsan, where apartments for two million households were constructed, as well as apartments in Seoul are nearing 20 years from initial construction, the time to execute maintenance in earnest has arrived. Now is the time to discuss optimal strategies for implementing permanent policies of sustainable maintenance for these apartments and all housing going forward.

Section 3 is therefore intended to seek directions for the establishment of financing programs for the maintenance of apartment houses in Korea going forward. In doing so, Section 3 identifies effective financing programs in New York City and Tokyo Metropolis.

3. Systems of financial support for the maintenance of apartment housing in New York City and Tokyo

This section surveys the recipients of financial support for housing maintenance, the contents of preference programs, and the conditions of application and preference of various loan programs in New York City and Tokyo. The focus is on the subsidies and tax incentive programs of the focal cities in order to seek workable ways for the application of similar programs in Korea.

3.1. Loan programs

The loan programs of New York City are designed to keep interest low for borrowers by way of the city undertaking partial payment of interest accrued. New York City's loan programs can be divided into eight programs, including the Participation Loan Program and New Partners Program [18,29–33]. The programs in New York are intended mainly for small apartment houses, low-income classes, the elderly, and the disabled.

The loan programs of Tokyo can be divided into programs conducted by the central municipalities of Tokyo Metropolis and those executed by designated organizations for the support of housing financing. The loan programs of Tokyo Metropolis and its municipalities partially support interest on funds required for effective housing maintenance, similar to New York. These loan programs can be divided into funds for the coordination of house repairs, and housing loan programs for the elderly and the disabled. Organizations for the support of housing financing operate various programs, including loans for the reformation of public mansions, loans for rental house reformation, and special case systems for the elderly [34–37].

Unlike New York and Tokyo, no public financing of loans for housing maintenance is available in Seoul. In other words, when housing renovations are required, loans from general banks are the only option for financing.

Notable further details of various loan programs are as follows. New York City loan programs are intended for small buildings comprised of 20 households or less, composite buildings with vacancies, and buildings in which the residential environment is insufficient. The loan programs in Tokyo are intended for houses that are receiving loans, houses that require repairs, additions or renovations for the sake of improving the residential environment, houses belonging to the elderly or disabled, and houses that require reformation and anti-seismic renovation construction of attached public areas.

As for the contents of preference programs, New York programs are divided into programs that give preference to general citizens with small apartments, low-income individuals, and disabled and homeless people. Such preference programs provide long-term funding (up to a maximum of 30 years), and are associated with tax exemptions or deductions on loans provided. In Tokyo's case, preference programs are classified into funding for the coordination of house repairs and programs for the elderly and disabled. The majority of preference programs are composed of loan funds for house repair coordination. Loan programs for long-term funding up to 30 years are available in Tokyo, but mostly the programs are comprised of loans requiring payback within a period of 10 years or less. Organizations for the support of housing financing provide financing with loans for the reformation of public areas attached to mansions, loans for rental house reformation, and special case systems for the elderly.

As for application conditions, no particular conditions are required as long as eligibility for each particular loan program is met. Also, organizations require agreement that applicants will receive control of the NYC Rent Stabilization System. In the case of Tokyo, major application conditions are required, including resolution and agreement of management cooperation for renovation, debt guarantees from mansion management centers, and agreement of applicants to reside in qualifying areas for designated periods of time.

Regarding preferred conditions, Tokyo does not require any particular conditions for preference. In New York, however, applicants are subject to the control of the NYC Rent Stabilization System at the time when the loan program is initiated, and some programs require donations of 2 to 10 percent of project costs.

3.2. Subsidy programs

The only pure subsidy program existing in New York that does not require the repayment of funds is the Primary Prevention Program (Lead-Based Paint Treatment). The subsidy programs of Tokyo include the subsidy project for anti-seismic diagnosis of mansions, which is also known as the Tokyo mansion anti-seismic performance promotion project, and subsidy programs of the municipalities of Tokyo Metropolis [33,38–40].

Focal subsidy programs include the Primary Prevention Program of New York and Tokyo's project for the organization of anti-seismic diagnosis of mansions (or Tokyo mansion anti-seismic performance promotion project), as well as subsidy programs for houses requiring renovation [34,41]. Notably, the two cities only subsidize issues that are closely related to the safety of the citizens regarding local concerns such as lead paint in New York, and the reinforcement of earthquake resistance and the improvement of residential environments in Tokyo.

On preference contents, New York's Primary Prevention Program provides $8000–9000 per apartment without redemption. Tokyo offers mostly indirect subsidies, such as support for survey costs or diagnosis costs. The details of subsidy programs for Tokyo Metropolis municipalities differ by area, but various programs maintain both indirect subsidies and direct subsidies simultaneously, including support for costs of repairs and estimations, as well as direct fund support (in which part of construction is paid for directly) and cost guarantees. As for application conditions for subsidy programs, no particular conditions are required in New York. In Tokyo, however, some conditions are required, such as passing a certain period of time (5 years or 10 years) beyond

initial construction, upholding repairs according to the rules of management, and resolution of repairs through cooperation with management entities. Regarding preference conditions, no preference conditions are required in New York. In Tokyo, however, some subsidies require the submission of periodic progress reports.

3.3. Tax incentive program

New York City provides various tax incentive programs, including J-51, 421-b and 421-g for the smooth repair of houses [42–44]. The aim of these programs is reducing or exempting general real estate taxes. In Tokyo, tax incentive programs are broken down as housing loan reduction systems, anti-seismic renovation promotion systems, and systems for the promotion of housing renovations for the elderly and disabled [45–47]. These incentive programs offer tax deductions or exemptions mainly on income taxes and general real estate taxes for the amount spent on housing renovations. Some details of eligibility for tax incentive programs in New York include remodeling the inside of major parts of apartments, building modification from non-residential purposes to apartment housing and the remodeling of small buildings.

In Tokyo, tax incentive programs are available for the general remodeling of houses built in compliance with pre-revision, anti-seismic standards before May 31, 1981. Such general remodeling may include the extension of corridor width, relaxation of staircase slope, remodeling of restrooms, and installation of guardrails.

As for preference contents, in New York, long-term exemptions or reductions are offered incrementally on general real estate taxes for remodeling. In Tokyo, general real estate taxes and income taxes are exempted or deducted for general house remodeling, the improvement of anti-seismic performance, and the renovation of older houses.

Regarding application conditions, in New York, no conditions are required upon the acquisition of eligibility for tax incentive programs. In the housing loan tax deduction system of Tokyo, conditions for application require an income above a certain level, or a certain type of house structure and certain period of time beyond the completion of initial construction. Tax incentives for the promotion of anti-seismic remodeling and tax incentives for remodeling older houses do not require any particular conditions once program eligibility is acquired.

Regarding preference conditions, in New York, rent stabilization systems, or rent control systems are offered. In Tokyo, no particular condition is required upon the acquisition of eligibility for tax incentives.

4. Analysis of various types of financing programs for the maintenance of apartment housing in New York and Tokyo

In order to propose optimal systems of financial support in Seoul, this study analyzes the systems of financial support in New York and Tokyo. In this section, the various systems of financial support surveyed above are simplified, and key characteristics of each city's maintenance systems are identified. Through this process of simplification and identification, the characteristics of each program are classified by city, and an organized model for an effective system of financial support for housing maintenance in Korea emerges.

4.1. Loan programs

According to analysis of major subjects of loan programs in New York and Tokyo, the subjects can be classified as general remodeling, improvements to poor residential environments and safety related works such as the reinforcement of earthquake resistance, and help for the socially disadvantaged such as the elderly. Because New York City includes a lot of immigrants and multi-ethnic communities, loan programs are concentrated on housing with poor residential environments. In Tokyo, loan programs are focused on ensuring the safety of citizens through anti-seismic remodeling in preparation for earthquakes. In addition, major loan programs of both cities are intended for the socially disadvantaged such as the elderly and disabled members of the population. Preference contents are distinguished as coordination of funds for house remodeling, interest subsidies and tax incentives. Each of these programs is in effect in New York, but in Tokyo, only fund coordination and interest subsidies are supported.

Regarding application conditions, no particular conditions are required in New York. In Tokyo, however, certain conditions regarding policy issues are required. Example conditions include whether a management cooperative exists, as well as income levels, age, and debt guarantees. As for preference conditions in New York, funding is supported by the city, but the loans are under the control of the Rent Stabilization System with the upper limit of rent specified by the city. The Rent Stabilization System is important because the city is largely comprised of privately rented apartment housing.

On the other hand, the majority of loans in New York are long-term loans of up to 30 years provided through government guarantee, allowing homeowners to pay back the funds with stability. Advantageous conditions are available to owners in need of renovations or remodeling, but the intent of this provision is seen as an effort to control residents through policies of rent inhibition by proposing advantageous conditions.

In Tokyo, where loans are comprehensively undertaken by a specialized organization called the Housing Financing Support Organization, funds for housing renovation and remodeling are supplied with guaranteed stability, and may be paid back on fixed low interest plans. One drawback, however, is that despite considerable costs for renovation and remodeling, typical loan sizes are relatively small.

Furthermore, shorter-term loans of 10 years or less appear tight[5], so efforts are being made to develop stable long-term loans and fixed interest rates, as mentioned in the above discussion about the maintenance policies of Japan.

4.2. Subsidy programs

Major subjects of subsidy programs can be divided into cases where the safety of residents would be severely compromised without remodeling, and general remodeling. In New York, subsidies are available for the removal of lead paint. In Tokyo, the primary subjects of subsidy programs are remodeling for conversion to anti-seismic structures, which is eligible for high subsidization, and general remodeling, which has a relatively lower limit for subsidization.

Subsidy contents fall into categories of direct or indirect subsidies. Due to the nature of subsidizing to individuals with tax money that comes entirely from citizens, subsidies are under a great deal of dispute and are very limited in their scope of subjects. That is, subsidies are widely supported for issues that have attracted a general social consensus, such as the recognition of the severe threat to the safety of citizens if housing structures are not remodeled according to anti-seismic standards. In the case of general remodeling, however, it is difficult to judge whether

[5] Responses are based on the results of the Mansion General Survey (Ministry of Land, Infrastructure, Transport and Tourism, 2008) and interview results from the Housing Financing Support Organization.

the individual executes remodeling or not, so subsidies are manifested as indirect financial support for survey expenses and other costs, or direct subsidies limited to a minimal amount of total construction costs. Some Tokyo municipalities support indirect subsidies and direct subsidies simultaneously. Indeed the best strategy is to selectively execute subsidy programs depending on local characteristics.

In any case where a serious threat is imposed to the safety of citizens, no particular application conditions are required for subsidy programs. For general remodeling, however, the issue needs to fall within the scope of government policy.

Since subsidy programs are conducted with an emphasis on safety according to government policy, no preference conditions are required.

4.3. Tax incentive programs

According to analysis of major subjects of tax incentive programs in New York and Tokyo, the subjects can be divided into modification of building usage from purposes of non-residence to residence, promotion of house remodeling for the improvement of poor residential environments, the provision of housing for the elderly, and the reinforcement of earthquake resistance performance. In New York, tax incentive programs are intended for modification of building usage from purposes of non-residence to residence through the remodeling of interiors or due to general housing shortages. In Tokyo, the programs are intended for general remodeling, elderly housing, and remodeling to meet anti-seismic standards.

Preference contents are divided into general real estate taxes and income taxes. In New York, preference is given to general real estate taxes. In Tokyo, both income taxes and general real estate taxes are eligible for preference. In New York, tax incentives are offered incrementally on general real estate taxes by remodeling, but in Tokyo, tax incentives and reductions are only partially offered on money borrowed for costs of remodeling or construction. As for application qualifications, no particular conditions are required in New York. In Tokyo, however, certain income conditions and housing structure conditions are required for application. Regarding preference conditions, control by the Rent Stabilization System is enforced in New York. In Tokyo, no preference condition exists.

5. Proposal for an optimal system of financing for the maintenance of apartment housing in Seoul

This section proposes a financing plan for Korea based on the content of Sections 3 and 4, which was identified through extensive literature review and local surveys.

To that end, opinions were gathered from seven experts in research organizations including the Korea Land & Housing Corporation and Korea Institute of Construction Technology, as well as relevant organizations such as the Korea Housing Finance Corporation and Korea Facility Safety Corporation through interview surveys and e-mail correspondence. Based on the interview surveys, the preparation of guarantee systems that mitigate the borrower's credit risks, and the clear establishment of basic provisions for the national government and municipalities to support the funding of stable systems of financing for sustainable housing maintenance in Korea were proposed as prerequisite conditions through seminars and workshops. The proposals are discussed below in Section 5.4.

5.1. Loan programs

In the cases of New York and Tokyo, loan programs are intended mainly for houses requiring remodeling, houses having poor residential environments, protection against earthquakes, and the provision of housing for the elderly and disabled. In Seoul too, housing for the elderly, apartment houses having poor residential environments, and houses requiring remodeling are the major subjects of loan programs. As for the elderly, Korea shows the highest rate of increase in the number of elderly citizens amid the rapid rise of the elderly among all the countries of the OECD, and therefore offers top priority to the elderly class for existing loan programs. In Seoul, housing prices are high relative to the rest of the world, and thus the low-income and socially disenfranchised classes are relegated to poor residential environments. Poor residential conditions lead to the anticipation of severe threats to the safety of residents, so financing for houses having poor residential environments is also prioritized. Government resources for houses requiring general remodeling are limited, so any financing for remodeling purposes is applied with specified limits on funding.

In addition, because approximately 80 percent of the apartment houses in Korea are less than 20 years old, financing programs to meet demands for the repair of equipment, pipes, and finishing materials such as exterior walls and tile need further review.

As for preference contents, because Seoul's financial resources are limited, the coordination of funds from private commercial banks together with partial subsidies on interest is considered. Specifically, in cases where serious problems exist concerning safety or inadequate residential environments, direct funding from the city will be considered. Interest subsidies in both New York and Tokyo are offered on a limited basis so that the interest rates remain low. Particularly for the elderly and disabled, additional interest subsidies are offered. As for the guarantee of funds borrowed from private commercial banks through fund coordination, commitment to this process is typically considered by selecting the particular organization known as the Mansion Management Center. In addition, subsidies for guarantees executed by the city of Tokyo are considered.

As for application qualifications, agreement and debt guarantees by representative council of occupants are required. Regarding preference conditions, no conditions are required for general maintenance, but certain conditions may be specified on a need-to-do basis depending on policy characteristics.

5.2. Subsidy programs

As for the major subjects of Seoul's subsidy programs, houses that pose a severe threat to the safety of citizens, energy saving houses, and houses requiring repairs or remodeling are considered.

Asbestos is a common threat to the safety of Seoul residents in particular. Because asbestosis is known to be present at approximately 3000 housing locations, the likelihood that residents have been exposed to asbestos on a widespread basis is very high. Dangerous levels of asbestos were exposed when many buildings were demolished during the 1980s and 1990s due to redevelopment projects, and subsequent cases of lung cancer and asbestosis poisoning have been occurring among the population of Seoul. Asbestos exposure from the demolition of buildings due to large-scale new construction projects imposes a serious threat to the health of citizens.

Therefore, subsidies for the replacement of buildings that have used asbestos in Korea require thorough review. Furthermore, a considerable number of apartment houses in Korea are approaching the designated period for repair, so subsidies for the costs of surveys to determine whether major structures or equipment require remodeling or repairs also need review.

Preference contents are considered for either indirect subsidies or direct subsidies. Indirect subsidies include the costs of surveys

reviewed by judges to determine whether remodeling is necessary, diagnosis costs, and fee requirements for debt guarantees on borrowing funds from designated financial organizations. Direct subsidies include systems that partially support construction costs by funding a limited amount of total expenses. Seoul has options to subsidize with indirect subsidies and direct subsidies, as well as programs for the simultaneous execution of both indirect and direct subsidies.

As for application conditions, in cases where subsidies are mandated by important initiatives such as anti-seismic construction in Japan and lead paint prevention in New York, no particular conditions are specified as a matter of principle.

In cases of subsidies according to general policies, however, conditions such as the organization of a council of representatives for occupants, as well as resolution by this council of representatives on repairs, and conditions for occupants above a certain age or below a certain income may apply. Preference conditions are applied depending on differing subsidy characteristics

5.3. Tax incentive programs

The tax incentive programs of Seoul are primarily applied to the remodeling of older housing, the remodeling of poor residential environments, or structures requiring maintenance and modification for conversion from commercial buildings to residential use.

As for preference contents, general real estate taxes and income taxes are the subjects. More specifically, exemption and reduction of general real estate taxes for certain time periods, and income tax deduction within limited amounts or specified ratios are considered.

Application qualifications are not particularly specified. Some conditions, however, such as applicants with incomes below a certain level or social disadvantages such as the elderly and disabled, are typically given priority. Preference conditions are not particularly required, but may be specified by government policies. Because tax incentive programs are difficult to negotiate among departments, proposed programs require advance securement of discussions about sustainability with relevant departments including the Korea Ministry of Finance and Economy, as well as preparation of social environments and thorough reviews of plans to utilize new construction tax money as funding for the maintenance of existing housing.

5.4. The plan for financing support

In order to adopt the financing programs proposed in this study, preliminary conditions, such as funds to promote financing support, are critical.

Korea has no previous experience with government-supported financing for housing maintenance, so these types of financing programs for maintenance are still at the beginning level. Individuals with sufficient funding capacity may be able to execute renovation and remodeling with their own funds, but as a considerable number of citizens, such as the mid-low income classes and the elderly and disabled, are not financially capable, additional government efforts are required to smoothly facilitate renovation and remodeling as necessary. In acknowledgment of the importance of preparing the social conditions and strategies to the end affecting new systems, our plan to promote widespread support for public financing by gathering expert opinions was proposed as follows.

First, the government and other designated organizations need to ensure a smooth process of private bank loans to applicants by providing reliable guarantees to mitigate personal credit risks, as well as partial subsidies on loan interests. The preparation of measures for smooth loans to borrowers in need of funding must be facilitated by minimizing requirements for the initial amount owed by borrowers, and by alleviating loan requirements through guarantees of government payment.

In cases of the U.S. and Japan, financing for housing is undertaken primarily by private banks, with respective governments providing guarantees and interest subsidies. Particularly for houses that accommodate elderly or disabled residents with no ability to make a living, and parentless families that typically lack guarantees and general requirements for loan qualification, obtaining loans from private banks is difficult. Therefore, government-supported direct financing and subsidization need to be provided up front.

Furthermore, implementation of financing for maintenance through tax reductions on loans for apartment housing maintenance may be reviewed. In the U.S., economic recovery after the Great Depression in the 1930s occurred in part through the implementation of housing financing. Also in Europe, financing for housing maintenance has been used to bolster the economy through measures of localized activation and the creation of employment in many instances throughout history [48].

Regarding the apartment housing in Korea, approximately 80 percent (i.e., 9.9 million households nationwide and 1.8 million households in Seoul) is comprised of houses nearing 20 years of age, and the timely activation of financing for housing maintenance would produce considerable positive effects to bolster the economy and create employment.

Next, it is necessary to establish a system that can evaluate housing price based on house quality and performance by setting up house history system that can assess such quality and performance. In addition, it is also necessary to review the method to deduce property tax if a house is owned for long time or reduce tax or support subsidy if attempts are made to raise house quality and performance.

In the meantime, there is a need for plans such that municipality deducts tax for apartment houses complex or assigns incentives in the form of tax deduction or subsidy when apartment complex of applicable performs maintenance work properly to induce proper performance of apartment complex maintenance.

In addition, funding resources for apartment housing maintenance need to be raised. Fundraising plans for the stability and sustainability of apartment housing maintenance are proposed as follows:

a) The first plan is to raise funds from a designated portion (about 1%) of construction costs on new construction and utilize these funds for loans or subsidies for maintenance. The funds raised by way of such a process would be utilized as a source of stable funding for maintenance only. Considering the example of France, about 5 billion Euro were raised from 1 percent of designated housing funds, and the money was utilized as a major source of funds for their city regeneration program [48].
b) An alternate plan is to utilize the existing nationals housing fund. Currently, the nationals housing fund is being utilized for lot sales and rental house construction, as well as funding for leases and loans for the purchasing of homes. The nationals housing fund, which amounted to 27 trillion 700 billion won as of 2010, is public in nature. If just 1 percent (approximately 270 billion won) of the fund were to be relegated for the support of funding for the remodeling of housing for segments of the population requiring government support (e.g., the elderly and disabled) in the form of loans and subsidies, considerable policy effects would occur to improve welfare and create employment.

Finally, an organization of experts to closely monitor financing support and further develop and refine policies is critical.

Korea has very little experience with financing for housing maintenance, so it is necessary to designate a particular organization

of experts to minimize the negative consequences of trial-and-errors that may arise at the initial stages of execution, and to maximize the quality of financing services on an ongoing basis.

6. Conclusions and tasks for future research

Partly due to the majority of existing apartment housing approaching 20 years from initial construction in the large cities near Seoul, as well as in the city of Seoul itself, a full scale discussion about how to recycle and maintain existing housing has emerged as an important aspect of Korea's national dialog. Directions for the establishment of financing programs for the sustainable maintenance of apartment housing in Korea are proposed through analysis of existing financing programs for apartment housing maintenance in New York and Tokyo. Accordingly, conclusions are obtained as follows:

First, policies on the maintenance of apartment housing in New York and Tokyo were examined. Through this examination, the current status and deficiencies of maintenance policies for apartment housing in Korea were assessed.
Second, the contents of financing support systems in New York and Tokyo designated for apartment housing maintenance, including the major subjects of financing programs, preference contents, and application conditions were identified. On this basis, the different types of financing support systems in both cities were analyzed.
Third, based on financing programs in New York and Tokyo, our plan to promote financing for the maintenance of housing in Korea, which is at only the beginning stages in Korea, was proposed.

In establishing directions for an optimal financing program as proposed in this study, the relevant studies and analysis on existing programs of financing for apartment housing maintenance in Korea fall significantly short. Therefore, the financing programs of the U.S. and Japan serve as models. Specifically, test projects are required to minimize negative consequences of trial-and-errors. For future projects, the establishment of designated funds for programs of financing, estimations of scale, in-depth studies about government guarantees, and the establishment of specialized organizations of experts to manage the new policies are required.

Finally, theoretical arguments may arise about whether the utilization of the government's public funds for the support of private apartment housing is justifiable. The first important step is to reach a social consensus on the matter.

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